Washington State Ferries:
Vessel Construction Costs

Washington State Transportation Commission
January 24, 2013

Larisa Benson, Director of Performance Audit
Susan Hoffman, Principal Performance Auditor
Carolyn Cato, Audit Lead

WASHINGTON
TROY KELLEY
STATE AUDITOR

Today's presentation

- Why we did this audit
- Overview/What we did
- What we found
- The Recommendations

Why we audited WSF's Vessel Construction Program

Today's presentation

- Why we did this audit
- Overview/What we did
- What we found
- The Recommendations

Our audit questions:

- How do construction costs for WSF's vessels compare to other purchasers?
- What factors affect construction cost and total construction spending?
- Does WSF follow leading practices to design and construct its ferries?

What we found

- It costs more to build a ferry when WSF is the purchaser.
- WSF has learned lessons and improved since building the Jumbo Mark II class.
- Vessel construction costs could be further reduced through better use of leading practices.
- Two regulatory requirements limit competition and increase construction costs.
  - Build in Washington laws
  - Apprenticeship Act requirements

WSF Vessels included in our analysis

Class – Passenger/vehicle capacity	Vessel name, year built
Jumbo Mark II – 2,500 / 202	*Tacoma, 1997*
	Wenatchee, 1998
	Puyallup, 1999
Kwa-di Tabil – 750 / 64	*Chetzemoka, 2010*
	Salish, 2011
	Kennewick, 2012

Ferry purchasers we visited

These purchasers provided data on the 39 ferries in our analysis.

Alaska Marine Highway System	Staten Island Ferries
North Carolina Department of Transportation	Texas Department of Transportation
Pierce County Public Works and Utilities	Woods Hole, Martha's Vineyard & Nantucket Steamship Authority
San Francisco Water Emergency Transportation Authority	Washington State Ferries

We also visited British Columbia Ferry Services. While they shared information on their new ferry construction program, we did not include their vessels in our analysis.

What we did

Our audit methodology included:

- Cost analysis
- Assessment of regulatory environment
- Leading practices
- Case studies
- Technical panel

Today's presentation

- Why we did this audit
- Overview/What we did
- **What we found**
- The Recommendations

Understanding vessel construction costs

- What do ferries cost?
- How do WSF's ferry construction costs compare with other purchasers?
- What are the significant factors affecting construction costs?

Comparing vessel construction costs

The Island Home – Total cost $48 million
(2011 dollars)

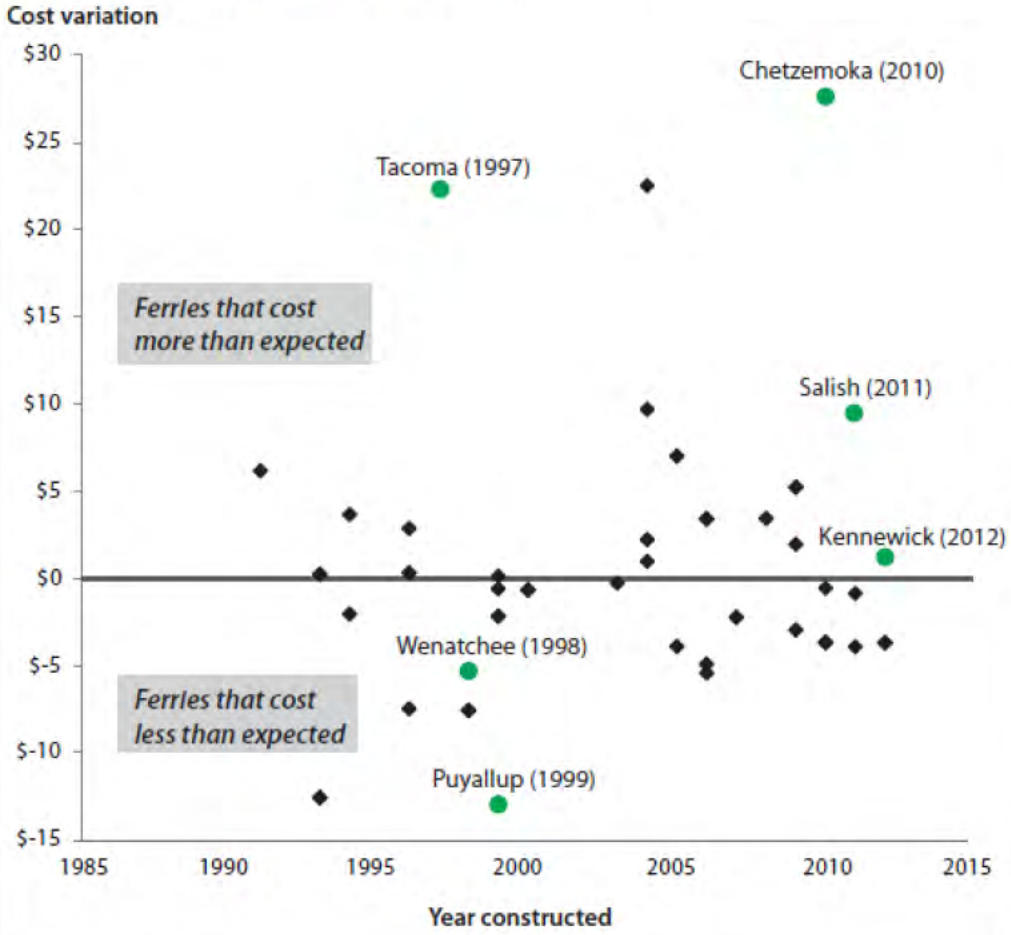
The Chetzemoka – Total cost $87 million
(2011 dollars)

Chetzemoka	2010 dollars (unadjusted)	2011 dollars (adjusted)
Final shipyard contract (total paid to shipyard)	$76,374,673	$79,676,538
Total cost *	$83,641,508	$87,257,536
**Includes $3.1 million for propulsion system costs.*		

Costs when controlling for differences in design characteristics

Exhibit 9 - Comparing construction costs of 39 ferries when design characteristics are controlled for in the analysis

Dollars in millions, adjusted to 2011 value.
WSF vessels named (with construction year).



Source: Analysis of ferry purchaser data.

What factors impact total construction costs?

- Use of vessel design and construction contracting leading practices
- Regulatory environment

Leading practices

We assessed WSF's use of the 15 leading practices we identified.

(Please refer to the handout or page 10 in the report.)

15 Leading practices in ferry construction and their use at WSF

We developed these leading practices based on our review of industry literature, interviews with WSF, ferry purchasers, and shipyards visited during the audit; they were then reviewed by the Technical Panel. We assessed WSF's use of the leading practices and discussed our results with the Technical Panel, which provided the conclusions shown below.

Description of leading practice	What its effective implementation looks like	Is this practice used effectively at WSF? Used effectively	Could be strengthened	Not used
Leading practices WSF uses that add value to the construction process				
1 Use a formal change order process that includes approval criteria.	Change orders reviewed and approved by appropriate level of staff, shared with management as needed, ensures only appropriate changes are approved to the contract.	√		
2 Require the shipyard to provide operational training, standard operating procedures, and spare parts.	Saves purchaser time and expense to develop materials and reduces maintenance costs.	√		
3 Secure the right to own the final as-built design for future reuse.	Owning the design avoids paying reuse or royalty fees if a follow-on vessel is ordered.	√		
4 Owner describes in detail specific needs and preferences.	Ensures clarity within contractor's and owner's organizations regarding the design, construction, and outfitting of the desired finished vessel.	√		
5 Project partners agree to a Project Charter outlining the purpose, goals, and expected outcomes of the project.	Ensures all parties are 'on the same page' and promotes better working relationships.	√		
6 Project Plan fully developed, outlining timelines, personnel/vendor roles and responsibilities, expected duration of the project. Plan is updated throughout project.	Ensures that purchaser and shipyard understand roles and tasks, project goals, and what expectations they must meet.	√		
7 Define responsibility and establish processes to resolve issues in timely manner.	Having a resolution process in place helps reduce the risk of disputes jeopardizing the production schedule.	√		
8 Use a steering committee to review and approve changes.	Ensures appropriate stakeholders are involved in reviewing and approving changes.	√		
Leading practices that WSF uses but could strengthen				
9 Use a formal process to ensure 'lessons learned' activities are completed in a timely way and effectively used on subsequent projects.	To improve its use of this leading practice, WSF should establish and use performance metrics to monitor progress based on independent collection of data from all stakeholders.		√	
10 Develop project budgets based on appropriately estimated project costs; do not depend on large contingency amounts.	To improve its use of this leading practice, WSF should limit its contingency budgets to no more than 5% of the total. Large contingency amounts undermine the integrity of fixed-price contracts.		√	
11 Use chosen contracting method effectively.	To improve its use of this leading practice, WSF should not employ multiple design firms and should consider using one contract to cover vessel design and construction.		√	
Four key leading practices that, if implemented together, offer the best opportunities to reduce costs				
12 Use a fixed price contract.	Fixed-price contracts require the contractor to deliver the project for a set price.		√	
13 Design is complete and reviewed before construction begins.	Helps prevent cost overruns on fixed-price contracts by purchaser not being responsible for changes to an approved design.			√
14 Use an independent owner's representative.	This advocate for the purchaser performs quality oversight, manages the change order process, and ensures project does not depart from the contract.			√
15 Owner places all responsibility on contractor to deliver project quality.	Allows the owner to hold the shipyard accountable for errors and omissions.		√	

Leading practices

Four additional leading practices – if implemented together - have the greatest potential to reduce costs:

- Use and adhere to a fixed price contract
- Complete vessel design before beginning construction.
- Use an independent owner's representative.
- Place ALL responsibility for project quality and delivery on the shipyard.

Leading practices

Three leading practices could be strengthened:

- Improve "lessons learned" activities by completing them in a timely manner, using performance metrics, and collecting information independently from all stakeholders.
- Do not include large contingency amounts in project budgets because they undermine the integrity of fixed price contracts.
- Effectively implement design-build contracting by only using one contract to cover vessel design and construction.

British Columbia Ferry Services

What makes BC Ferries successful?

- Established vessel replacement criteria.
- Adopted a 'functional specification' approach to vessel design.
- Opened procurements to shipyards outside BC.
- Used fixed price contracts.
- Required shipyard to assume all responsibility for design and construction of new vessel.
- Made changes to construction contracts by using:
  - Design-build contracts
  - Price de-escalation clauses
  - Performance guarantees
  - Warranties
  - Right of refusal on final delivery

Regulatory environment limits competition

- **Build in Washington laws**

  Limit WSF to building its ferries in Washington shipyards.

- **Apprenticeship Act requirements**

  Since 2007, further limits WSF to Washington shipyards with a state-approved apprenticeship program.

These requirements meant WSF received only one bid for the last two ferry classes built…

Economic impact of Build in Washington

To estimate the economic impact of Build in Washington, we used the following assumptions:

- Build two ferries
- Costing $75 million each
- During fiscal years 2013 and 2014.

The results:

- An average of 322 jobs and $28 million in wages **in the shipbuilding industry** in each fiscal year.
- An average of 1,335 jobs and $90 million in wages **across all sectors of the economy** in each fiscal year.

Our thanks to OFM for using their Input-Output model to produce these estimates for our audit.

Today's presentation

- Why we did this audit
- Overview/What we did
- What we found
- **Recommendations**

Recommendations to WSF

We recommend WSF continue to improve its vessel construction program by determining whether adopting the leading practices and suggestions for improvement provided would result in program improvements and/or cost savings, and implementing those with the greatest potential to provide benefit to the program.

- Fully adhering to fixed price contracts for ferry design and construction.
- Completing vessel design prior to beginning construction.
- Using an independent owner's representative.
- Shifting all responsibility for project quality and delivery to the shipyard.
- Timely completion and effective use of "lessons learned."
- Strengthen financial management of construction contracts.
- Improve use of design-build contracting method.

Recommendations to the Legislature

We recommend that the Legislature address the regulatory barriers that limit competition on WSF vessel procurements by:

- When insufficient interest or higher than expected bids are received from Washington shipyards, allowing WSF to use alternative strategies to encourage competition for its ferry procurements. One possible strategy would be to allow WSF to invite bids from out-of-state shipyards in these instances.
- Undertake a study of the Apprenticeship Act to identify and resolve barriers for prospective applicants, in particular shipyards with established training programs.

Contacts

Larisa Benson
Director of Performance Audit
(360) 725-9720
Larisa.Benson@sao.wa.gov

Susan Hoffman
Principal Performance Auditor
(360) 725-9719
Susan.Hoffman@sao.wa.gov

Website: www.sao.wa.gov

Twitter: www.twitter.com/WAStateAuditor